

CHICAGO SANITARY AND SHIP CANAL, LOCKPORT LOCK
2502 Channel Drive
Lockport vicinity
Will County
Illinois

HAER IL-197-D
IL-197-D

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

REDUCED COPIES OF MEASURED DRAWINGS

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
U.S. Department of the Interior
1849 C Street NW
Washington, DC 20240-0001

HISTORIC AMERICAN ENGINEERING RECORD
CHICAGO SANITARY AND SHIP CANAL, LOCKPORT LOCK

HAER No. IL-197-D

Location: 2502 Channel Drive, Lockport vicinity, Will County, Illinois
UTM – Latitude: 41.569239; Longitude: -88.077788

Present Owner: Metropolitan Water Reclamation District, Chicago

Present Use: Abandoned

Significance: Located at the terminus of the Chicago Sanitary and Ship Canal, the Lockport Lock has a 40’ lift, reportedly making it the highest lift lock at the time of its completion in 1910. The Lockport Lock was soon superseded by a larger lock built adjacent to it as part of the Illinois Waterway. The lock has remained basically unchanged since its construction and stands as an example of early twentieth century lock technology.

Historian: Justine Christianson, HAER, 2009

Project Information: The Chicago Sanitary and Ship Canal Recording Project was undertaken during the summer of 2009 by the Historic American Engineering Record (HAER), a division of the National Park Service, U.S. Department of the Interior. The project focused on a 2.2-mile-long section of the canal between Illinois Waterway River Miles 291.1 to 293.3. The U.S. Army Corps of Engineers sponsored the project with research assistance and access provided by the Metropolitan Water Reclamation District of Greater Chicago. The field team consisted of Dana Lockett, HAER Architect and Project Leader; Nicole Martineau, HAER Intern; and Justine Christianson, HAER Historian. Jet Lowe, HAER Photographer, produced the large format photographs.

For additional information, see:

Chicago Sanitary and Ship Canal, HAER No. IL-197

Chicago Sanitary and Ship Canal, Lockport Controlling Works, HAER No. IL-197-A

Chicago Sanitary and Ship Canal, Butterfly Dam, HAER No. IL-197-B

Chicago Sanitary and Ship Canal, Lockport Power House and Dam, HAER No. IL-197-C

Illinois Waterway, Lockport Lock, Dam and Power House, HAER No. IL-164-H

Part I. Historical Information

A. Physical History:

1. **Dates of Construction:** 1905-10
2. **Architect/Engineer:** Isham Randolph, Chief Engineer, Sanitary District
3. **Builder/Contractor/Supplier:** Hayes Brothers & Company, Janesville, Wisconsin¹

4. **Original Plans:**

Isham Randolph's original design of the Lockport Lock is preserved in a 1905 drawing and 1908 description published in *Engineering News*. According to Randolph, the lock was the "highest lift lock yet built" with a 41' maximum lift and a 34' mean lift.² The 22'-wide x 130'-long reinforced-concrete lock chamber had two sets of miter gates at each end. The interior sets of gates were used for regular operation while those at the exteriors were guard gates to be used only in emergency situations. The installation of guard gates at both ends of the lock chamber is unusual. The upper main lock gates measured 22'-10" high while the lower main gates were markedly taller at 56'-10". The guard gates at both ends measured 16'-10". All the gates were constructed of horizontal courses of Oregon fir with steel rods extending diagonally across the faces. These rods were equipped with turnbuckles for tightening. The gates sat on wood miter sills measuring 18" x 18", while the quoins were made up of 15" steel channels and 15" I-beam quoin posts.³

¹ Other sources attribute the construction of the lock to Lorimer & Gallagher Company and Joseph J. Duffy of Chicago, perhaps because those two companies held the contracts to build the Chicago Sanitary and Ship Canal extension. This attribution can be found in Mary Yeater Rathburn and American Resources Group, Ltd, *Architectural and Engineering Resources of the Illinois Waterway between 130th Street in Chicago and La Grange, Illinois*, Volume 1 (October 1996), 53, who was citing Lee Hanson, ed., "An Inventory of Historic Engineering and Industrial Structures within the Illinois and Michigan Canal National Heritage Corridor," Draft Report, Historic American Buildings Survey and Historic American Engineering Record, and Illinois and Michigan Canal National Heritage Corridor (National Park Service, U.S. Department of the Interior, 1992). This information was consequently repeated in the Illinois Waterway, Lockport Lock, Dam and Power House, HAER No. IL-164-H report. However, further research in the 1906 *Proceedings of the Board of Trustees* reveals that Hayes Brothers & Company were awarded the contract to build the lock, movable dams and fender wall. See *Proceedings of the Board of Trustees of the Sanitary District of Chicago from January 1, 1906 to December 31, 1906* (Chicago: John F. Higgins, Printer, 1907), 11248.

² The Sanitary District of Chicago, "Engineering Data on the Sanitary District of Chicago," (June 1910), 7. Quote from Isham Randolph, "The Sanitary District of Chicago, and the Chicago Drainage Canal: A Review of Twenty Years of Engineering Work," 1909, 8.

³ Randolph, "The Sanitary District of Chicago, and the Chicago Drainage Canal," 8; "The Water Power Development of the Sanitary District of Chicago," November 12, 1914, 1773; "The Movable Dams and Lock at the Power Plant on the Chicago Drainage Canal," *Engineering News* 60, no. 20 (November 12, 1908): 514. The *Engineering News* article gives the lock chamber size as 22' x 117' with a 34' lift.

The 1905 drawings depict the gates being maneuvered by ropes. One set, known as the operating ropes, opened and closed the gates, while the other, known as the synchronizing ropes, helped coordinate the movement of both leaves. The ropes, made up of 5/8" "extra-flexible wire cables covered with a special waterproofing composition," passed over guide sheaves in wells located at each gate leaf on both the upstream and downstream ends. The rope attached to a sprocket chain that ran over a sprocket wheel driven by electric motors and gearing. The operating machinery consisted of a 250-volt, direct current, 6-horsepower motor. The guard gates could be operated by hand when necessary but were kept in the open position with a hook and eye attachment.⁴

It is unknown if this original design was actually implemented. Although the 1905 plans show ropes operating the lock gates, a 1911 drawing titled "New Machinery for Lock Gates" and the existing conditions show that either the ropes were not installed or they were replaced with different operating machinery. As depicted in 1911, an arm attached to the bottom center of each gate leaf and extended to the chamber wall, where it ran along a track in the wall. The motive power was supplied by a motor and series of gears and pinions.⁵

A conduit, noted as being lined with "hard burned brick," ran through the chamber wall and had outlets extending from it to fill and empty the chamber. The Sanitary District left the decision as to the size and number of the outlets up to the contractor. A well located at the upper end of the lock chamber and identified as the upper or filling valve extended from the top of the chamber and intersected with the conduit. A second conduit extended from this well and opened outside the miter gates. Another well at the downstream end and identified as the lower or emptying valve intersected with the conduit at the downstream end. These wells were equipped with valves that controlled the flow of water through the conduit. The valve wells were 5'-2" in diameter, and held the valves, consisting of steel cylinders measuring 4'-8 1/2" in interior diameter. The upper valve cylinders were 16' long while the lower ones were 47' long. The top of each cylinder had a "cast-steel spider to which operating cables are attached, and through which passes a 2 1/2-in. steel rod whose lower end is screwed into the bottom spider of the valve ring." The cylinder rolled on vertical rails up and down the well, with power provided by an electric hoist and a 250-volt, direct current, 6-horsepower motor.⁶

⁴ Sanitary District of Chicago, Water Power Development, Canal Lock, Walls and Movable Dams, "Lock, Arrangement of Operating Cables for Gates," December 1905, Sheet No. 6, available from the Metropolitan Water Reclamation District of Greater Chicago (hereafter cited as MWRD); "Movable Dams and Lock at the Power Plant," 514.

⁵ Sanitary District of Chicago, Water Power Development, "New Machinery for Lock Gates, Lockport Power House, General Plan for Lower Gate," 1911, Sheet No. 1, available from MWRD.

⁶ "Movable Dams and Lock," 514; Sanitary District of Chicago, Water Power Development, Canal Lock, Walls and Movable Dams, "Lock, Plan and Longitudinal Section," December 1905, Sheet No. 2; Sanitary District of Chicago, Water Power Development, "Isometric View of Canal Lock and Movable Dam," May 1906, both available from MWRD.

As originally configured, an operator's house was centered on the landward chamber wall and contained the operating motors for the gates and valves. This 11' x 11' pine frame building had beveled white pine siding. Four windows and a door with a glass window punctuated the walls. The hipped roof was clad in cedar shingles and had a galvanized smokestack at its peak.⁷

The other notable feature of the lock was a set of concrete stairs on either side of the chamber at the downstream end. The stairs allowed access from the top of the chamber walls to the tailrace walls. The flights of stairs each sat on two concrete arches and had fifty-five risers and fifty-four treads with pipe railings.⁸

5. Alterations and Additions:

The stairs and landward chamber wall have been modified due to the construction of the adjacent lock for the Illinois Waterway. The eastern flight of stairs was removed at some point after 1927 (they are still shown on a drawing from that year). The other flight on the opposite side of the chamber has either been rebuilt or altered to sit on three arches and has sixty risers and fifty-nine treads.⁹

B. Historical Context:

An Act of the Illinois General Assembly authorized the Main Channel Extension and Water Power Development between the Controlling Works and the Upper Basin at Joliet in July 1903. This provided for the 10,600' extension of the Chicago Sanitary and Ship Canal from its original terminus at the Lockport Controlling Works and allowed the Sanitary District to generate water power. Since the extension would cross the Illinois & Michigan Canal (I&M Canal), thereby rendering that waterway non-navigable, a lock was necessary in the extension to overcome the high lift at the site and maintain navigation from the I&M Canal to the new canal.¹⁰

The Sanitary District advertised the contract for the lock's construction, along with two movable dams and one fender wall, in August 1905. Bidders included Hayes Brothers & Company of Janesville, Wisconsin; M.H. McGovern of Chicago; Page & Shnable of Chicago; and Joseph J. Duffy Contracting Company of Lockport. The contract was awarded to Hayes Brothers, who estimated the cost of construction at \$318,335. The lock opened for use on July 15, 1910.¹¹

⁷ Sanitary District, "Lock, Plan and Longitudinal Section," Sheet No. 2; Sanitary District of Chicago, Water Power Development, Canal Lock, Walls and Movable Dams, "Lock, Lock Sections and Operator's House," December 1905, Sheet No. 3, available from MWRD; "Water Power Development," 1773.

⁸ Sanitary District, "Lock, Plan and Longitudinal Section," Sheet No. 2.

⁹ The Sanitary District of Chicago, "Details, Constructing Main Channel Wall Near Lockport, Illinois, Contract No. 3," July 28, 1927, Sheet No. 5.

¹⁰ "The Water Power Development of the Sanitary District of Chicago," November 12, 1914, 1771-1772.

¹¹ *Proceedings of the Board of Trustees of the Sanitary District of Chicago from January 1, 1905 to December 31, 1905* (Chicago: John F. Higgins, Printer, 1906), 10727-28; *Proceedings of the Board of Trustees of the Sanitary District of Chicago from January 1, 1906 to December 31, 1906* (Chicago: John F. Higgins, Printer, 1907), 11237, 11248, and 11256; The Sanitary District of Chicago, "Engineering Works," August 1928, 23, available from the Chicago Public Library, Harold Washington Library Center.

The historical record contains little information on the design, construction and operation of the lock. This may be because the Sanitary District was primarily focused on generating water power and the powerhouse. In addition, it may be that the Sanitary District was aware of the public and state government interest in constructing a larger, higher capacity navigable waterway from Chicago to the Mississippi River than the Illinois & Michigan and Chicago Sanitary and Ship canals. Indeed, the State of Illinois and the federal government constructed a larger lock measuring 110' x 600' adjacent to the Lockport Lock as part of the Illinois Waterway. With the opening of that waterway and lock in 1933, the Lockport Lock was rendered obsolete and abandoned, having only been in operation for a short period of time.

Part II. Structural/Design Information

A. General Description:

The 22' x 130' lock has a reinforced-concrete chamber with wood miter gates at both ends. The chamber walls are equipped with "snatch blocks" for boats to tie to while locking through, as well as snubbing posts along the top of the chamber walls. The miter gates consist of steel frames and vertical timbers to which the horizontal timbers are attached. The operating mechanism is made up of an arm extending from the bottom of an inset in the concrete chamber wall to the bottom of the gate. The inset also contains a metal rod extending the height of the wall with teathed gears at three locations: the top, three-quarters of the way down, and the bottom.

1. Character:

The character of the lock has diminished due to its long period of abandonment and to the removal of the operating machinery and the lock house. In addition, significant alterations have been made to the landward chamber wall as the result of the installation of the Illinois Waterway lock immediately adjacent. However, original features, like the chamber walls and lock gates, remain.

2. Condition of Fabric:

The concrete chamber walls are spalling, and the wood miter gates are in poor condition as a result of their age and lack of use.

B. Construction:

Hayes Brothers & Company used concrete made of broken stone and limestone screenings to build the lock chamber. The Sanitary District specified that the concrete must be wet when poured, specifically "the mass when disturbed will quake like fresh liver but must not be so wet that water stands upon the surface."¹² No other information has been found on the construction of the lock.

¹² "Movable Dams and Lock," 515.

D. Site Information:

Lockport Lock is sandwiched between the Lockport Power House and former movable dams and the Illinois Waterway and lock, which are operated by the U.S. Army Corps of Engineers.

Part III. Sources of Information

A. Primary Sources

“The Movable Dams and Lock at the Power Plant on the Chicago Drainage Canal.”
Engineering News 60, no. 20 (November 12, 1908): 512-518.

Proceedings of the Board of Trustees of the Sanitary District of Chicago from January 1, 1905 to December 31, 1905. Chicago: John F. Higgins, Printer, 1906.

Proceedings of the Board of Trustees of the Sanitary District of Chicago from January 1, 1906 to December 31, 1906. Chicago: John F. Higgins, Printer, 1907.

Randolph, Isham. “The Sanitary District of Chicago, and the Chicago Drainage Canal: A Review of Twenty Years of Engineering Work.” 1909.

The Sanitary District of Chicago. “Engineering Data on the Sanitary District of Chicago.” June 1910.

_____. “Engineering Works.” August 1928.

“The Water Power Development of the Sanitary District of Chicago.” November 12, 1914.

Drawings, available from Metropolitan Water Reclamation District of Greater Chicago, Chicago, Illinois

Sanitary District of Chicago. Water Power Development, Canal Lock, Walls and Movable Dams, “Lock, Plan and Longitudinal Section.” December 1905. Sheet No. 2.

Sanitary District of Chicago. Water Power Development, Canal Lock, Walls and Movable Dams, “Lock, Lock Sections and Operator’s House.” December 1905. Sheet No. 3.

Sanitary District of Chicago. Water Power Development, Canal Lock, Walls and Movable Dams, “Lock Arrangement of Operating Cables for Gates.” December 1905. Sheet No. 6.

Sanitary District of Chicago. Water Power Development, “Isometric View of Canal Lock and Movable Dam.” May 1906.

Sanitary District of Chicago. Water Power Development, "New Machinery for Lock Gates, Lockport Power House, General Plan for Lower Gate." 1911. Sheet No. 1.

Sanitary District of Chicago. "Details, Constructing Main Channel Wall Near Lockport, Illinois, Contract No. 3." July 28, 1927. Sheet No. 5.

B. Secondary Sources

Scott, Branden K. and Lowell Blikre, Bear Creek Archeology, Inc. National Register of Historic Places Amended Multiple Property Submission and Nomination of the Chicago Sanitary and Ship Canal District to the Illinois Waterway Navigation System Facilities. Draft. May 2009.

Scott, Branden K., Bear Creek Archeology, Inc. "Chicago Sanitary and Ship Canal Historic District." National Register of Historic Places Nomination Form. Draft. May 2009.

C. Likely Sources Not Yet Investigated

Research was done at the Metropolitan Water Reclamation District of Greater Chicago's library and archives. However, when this research was being done in summer 2009, the engineer reports had been subpoenaed and were not available. Additional information on the design and construction of the lock may be found in those reports.